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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of PACIFIC GAS AND ELECTRIC COMPANY (U 39-E), for Approval of 2006-2008 Demand Response Programs and Budgets.

Application 05-06-006
(Filed June 1, 2005)

Southern California Edison Company's (U 338-E) Application for Approval of Demand Response Programs for 2006-2008 and Cost Recovery Mechanism.

Application 05-06-008
(Filed June 1, 2005)

Application of San Diego Gas & Electric Company (U 902-E) for Approval of Demand Response Programs and Budgets for Years 2006 through 2008.

Application 05-06-017
(Filed June 2, 2005)

**ASSIGNED COMMISSIONER'S RULING
AUGMENTING AUGUST 6, 2006 RULING REQUIRING UTILITY PROPOSALS
TO AUGMENT 2007 DEMAND RESPONSE PROGRAMS**

On August 6, 2006, I issued a ruling that reopened the record of this proceeding to consider augmented demand response programs for 2007 and 2008. The ruling appended a list of potential program elements for the parties' consideration. This ruling adds a program element to that list by directing the applicant utilities to propose ways of augmenting their demand response programs using a technology called "AutoDR." AutoDR is a communication device that links a customer's energy management control system to the utility's price or reliability signal over the Internet. This technology may be integrated with various existing utility demand response

programs, such as the critical peak pricing program. Attachment A to this ruling describes the technology and its potential uses in more detail. In addition, utility comments should identify ways to expand the role of demand aggregators, to encourage the deployment of AutoDR, increase program participation, and improve program performance. The utilities should also consider developing and expanding projects similar to PG&E's Business Energy Coalition (BEC), which provides demand response to large electric customers in San Francisco.

The utilities' proposals should consider whether the use of Technical Assistance/Technical Incentive (TA/TI) Program funds to support these program elements, including AutoDR, AutoDR administered by third party aggregators and programs similar to the BEC.

IT IS RULED that Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company shall include in their August 30 filings proposals for the deployment of AutoDR technology as described herein. The utilities should be prepared to discuss their associated proposals at the September 6 workshop.

Dated August 22, 2006, at San Francisco, California.

/s/ MICHAEL R. PEEVEY

Michael R. Peevey
Assigned Commissioner

Attachment A: Automated Demand Response In Commercial Facilities Accelerating Deployment for Summer 2007

Executive Summary

Automated demand response (AutoDR) provides commercial and industrial customers with electronic, Internet-based price and reliability signals that are linked into the facility energy management control system (EMCS) and related whole-building controls. AutoDR price and reliability signals trigger automatic customer-programmed energy management and curtailment strategies. The AutoDR price and reliability signals can be used to automate response to dynamic pricing (CPP and RTP) as well as conventional interruptible and demand bid options.

The LBNL Demand Response Research Center (DRRC) has been operating AutoDR pilot programs since 2003. Over thirty commercial facilities totaling over 10 million ft² have participated in and automatically reduced their electric loads through AutoDR participation. The research and pilots have been funded by CEC/PIER, PG&E, and SDG&E. A research plan for collaboration with SCE Demand Bid programs for summer 2007 has been finalized.

Pilots conducted over the past four years indicate that Auto-DR can deliver low-cost, reliable, consistently repeatable electric demand response in commercial facilities, even during multi-day heat storms. Automating demand response improves the repeatability of the demand response, reduces on-site labor costs associated with manual DR, and hardens the resource by requiring commitment to a consistent set of strategies. Automating DR with standardized, open protocols provides a DR infrastructure for future wide scale implementation that can be extended into future building and appliance controls. Because HVAC and lighting are the facility loads most likely to be controlled, the greatest demand response potential is available on hot summer weekday afternoons.

LBNL is currently planning or conducting Auto-DR pilots with all three California investor owned utilities. The existing LBNL/PG&E Auto-CPP pilot has 13 commercial facilities (2.2 million ft²) currently connected to the LBNL DR Automation Server. The system has the potential to shed up to 2.4 MW. Although facility managers were notified in advance of upcoming events (via e-mail, pager and text message) none exercised their option to “opt-out”. Significant sheds were measured in about 90% of the connected sites. Baselines with high noise and variability account for the remaining 10% of sites where predetermined strategies occurred, but sheds were not measurable.

Based on average results from the pilot program participants, about 1,300 to 2,000 new sites would be required to produce a 15-minute shed of 250 MW. For a 3 to 6 hour shed about 3,000 to 3,500 sites would be required. Both estimates assume that the average peak load reductions per site are also achieved by any new facility additions. This estimate also assumes that the energy usage and load characteristics of existing pilot participants are representative of potential new facility additions.

The technology, customer response and economics of AutoDR continue to provide consistent, reliable year-to-year results. Tests indicate that the existing AutoDR system is capable of supporting expansion to achieve the CEC-CPUC 250 MW demand response objective by summer 2007. Short-duration, high-intensity automated sheds could provide the utilities and ISO with additional low cost reliability and ancillary service options. Less intensive, longer duration sheds may be better suited to mitigate non-emergency adverse economic conditions. AutoDR can support both. While additional research and development is necessary to continue to improve facility response rates and further reduce costs, we believe that AutoDR is ready for broad-based commercialization and rapid expansion.

AutoDR Results

Preliminary results for the summer of 2006 (Table 2) show average facility peak load demand reductions of 13% for three-hour critical peak events and 15-minute peak load reductions per facility that average 33%. While the summer 2006 results are preliminary, results from prior years confirm average facility demand

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reductions of 13.4% (Table 1). During six-hour critical peak events AutoDR facilities have demonstrated capability to sustain approximately 10% reductions in peak load. The 10% reduction target has been achieved for small (under 300 kW) and large (over 500 kW) sites. The current Automated Critical Peak Pricing tests with PG&E are providing automated DR for about 10 MW of building load (Figure 1). Both a weather-normalized baseline based on LBNL analysis and the PG&E CPP baseline is evaluated for each CPP event.

Preliminary evidence also seems to indicate that AutoDR reduces facility energy use. Anecdotal evidence indicates that building operator activities to prepare the facility and tune-up the EMCS operation produce conservation benefits. Research results provide a preliminary indication that the shed strategies themselves also reduce overall facility energy use. AutoDR's ability to integrate efficiency, conservation and demand response by simultaneously reducing energy and peak load will be more fully documented in ongoing research.

AutoDR one-time setup costs averaged approximately \$58/kW from 2003 to 2005 (Table 1). One-time setup costs range from an average of \$26/kW for a 15-minute interruption to an average of \$62/kW for a six-hour interruption for the 2006 participating facilities (Table 2). This compares very favorably to the approximate \$250/kW setup cost for a conventional residential air conditioner load control program (cost of a typical load control switch and installation). Since AutoDR automates the facility demand response, ongoing operational costs are insignificant.

In cooperation with PG&E, four years of LBNL DRRC research documents that AutoDR provides a very low cost communication and technology infrastructure capable of supporting a broad range of reliability and economic demand response.

Technology Capabilities

AutoDR requires three basic technologies: a price or reliability signal generator (DR Automation Server); a communications device at each facility to receive the price and reliability signals (gateways and relays have been used), and a customer provided facility energy management and control system or related system for lighting or other controls.

DR Automation Server (DRAS)

AutoDR price and reliability signals are provided through the LBNL DR Automation Server (DRAS). DR price and reliability signals are transmitted using existing public Internet and private wide area networks (WANs). Facilities can be connected to the DRAS using software, hardware or other interface-based gateways.

Once a shed event is initiated the DRAS manages all communications, time buffering, and on-site connections. Unless a facility manager chooses to "opt-out" and override, their pre-programmed strategy sheds will occur without human intervention.

The DRAS version 2.0 was built to meet the high standards required for financial transactions using Internet technology. It was also designed to support a potential commercial implementation involving thousands of customers. The current version 2.0 server has successfully met all performance requirements, specifically:

1. **Flexibility** – Can connect with multiple utilities DR notification systems (Itron, PMC etc.).
2. **Reliability** – Has maintained its availability target of 99.99% (four nines). The DRAS is hosted at a co-location facility with triple redundant back-up UPS and generator systems. It is immune to blackouts and other threats.

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3. **Scalability** – Scalability tests indicate that the current system can support approximately 10,000 sites.
4. **Security** - The DR Automation Server architecture was designed to meet industry standards for financially binding transactions.

Client Gateway

The Client & Logic with Integrated Relay (CLIR Box) is a hardware device installed at AutoDR facilities. It receives remote DR signals from the DRAS, translates them into a format that can be read by the facility EMCS, which then enables the EMCS to automatically initiate the customer configured demand response strategies.

The CLIR box can be installed in virtually any site that has access to the Internet. It can interface with virtually any EMCS. The CLIR box can also be used for direct load control (e.g., disable a chiller) for sites without EMCS. It has passed rigorous computer network security tests.

The CLIR box was developed manufactured through collaboration between LBNL and Akuacom Inc. The bill of materials cost is \$750 each. Volumes, lead-time, distribution channels and other factors will dictate the unit cost for CLIR boxes during any 2007 expansion effort.

Issues, Potential Problems and Mitigation Measures

- 1) Recruitment and on-site implementation are the two areas that pose the most substantial challenges to the 250 MW demand response objective. Existing utility resources are not sufficient nor are they geared to rapid mass-market expansion. Achieving the 250 MW objective will require support from third-party private industry aggregators, customer associations and other interest groups.
 - a) *Mitigation*: Create capacity incentives and contractual arrangements to incent and encourage third-party aggregators.
 - b) *Mitigation*: Improve the incentives offered through existing pilot CPP tariffs.
 - c) *Mitigation*: Increase access to technical assistance and technology acquisition funds.
 - d) *Mitigation*: Create incentives that encourage utilities to outsource AutoDR implementation.
 - e) *Mitigation*: Examine and modify demand bid tariff options to increase incentives and relax participation and response conditions.
 - f) *Mitigation*: Consider direct subsidies, like those under the AB1X advanced metering initiative to facilitate a more rapid implementation of EMCS and other building automation options compatible with AutoDR.
- 2) Lack of energy management and control systems (EMCS) or centralized lighting controls in many commercial and industrial facilities is a major impediment to Auto-DR. Commercial and industrial facility owners must be provided with educational materials to better explain the benefits of AutoDR, the economics of demand response and efficiency benefits that will come with EMCS implementation.
 - a) *Mitigation*: Encourage the utilities to develop and initiate more aggressive customer education programs. Engaging market support from EMCS and other building automation providers, customer associations and other groups should be a priority.
 - b) *Mitigation*: Consider expanding the target customer groups and improving the incentives offered through existing pilot CPP tariffs.

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- c) *Mitigation*: see 1c and 1f.
- 3) Contractual obligations: Building operators of many multi-tenant office buildings are unable to participate in demand response options due to contractual obligations under their tenant leases. While the DRRC is conducting research to identify potential solutions, this problem may not be resolvable in the near term or it may require legislative or emergency actions under the Resources Code.
- a) *Mitigation*: Examine legal options under the Resources Code that may under emergency conditions allow building operators to temporarily invoke demand response strategies.
- 4) Process loads: Some commercial and many industrial facilities perform processes that cannot be varied without significant financial cost. This issue is not necessarily resolvable in the near term as additional research is needed to understand what industrial processes lend themselves to AutoDR approaches. However, HVAC and lighting shed strategies used for the commercial sector may be usable by many industrial sector customers.
- 5) DRAS Commercialization: To meet IT industry standards for mission critical applications (such as DR during a heat storm) substantial testing and upgrades should be conducted prior to the summer of 2007. This work should begin immediately.
- a) *Mitigation*: Implement a high priority DRRC task to scope out and complete this work.
- 6) CLIR Boxes Production: The current design could be produced in the thousands as necessary to meet the 250 MW goal in 2007. Work on this effort would need to begin immediately.
- a) *Mitigation*: Implement a high priority DRRC task to scope out and complete this work.
- 7) Demand Response Integration Services Contractor (DRISCO): To facilitate more rapid expansion of AutoDR, the DRRC defined the skills and hired a third-party contractor to assist the 2006 pilot sites with AutoDR implementation. This third-party capability needs to be rapidly expanded to support attainment of the 250 MW demand response objective for 2007. The skills required for a DRISCO may be difficult to obtain in the near term.
- a) *Mitigation*: Begin an RFI and/or RFQ process to identify potential DRISCO candidates, aggregators and others that might be qualified and interested in supporting AutoDR implementation.
- b) *Mitigation*: Examine other options for using training or engaging corporate and customer association resources to support the AutoDR implementation requirements.

Based on recent results we recommend accelerating automation in key market segments such as include retailers chains and government buildings. LBNL has had significant success with federal government facilities, university buildings, and local government buildings. Stronger motivation for state government buildings would help accelerate automated DR. LBNL and the DRRC will continue to evaluate barriers toward broader scale DR deployment.

Further details on Auto-DR are available at drcc.lbl.gov.

**Automated Demand Response In Commercial Facilities
Accelerating Deployment for Summer 2007**

**Table 1
Results of LBNL / PG&E Auto-CPP in 2003-2005**

Company	Avg kW Savings	Avg % Savings	Max kW Savings	Events (2003-4 /2004)	Setup Cost
ACWD	52	20%	84%	4(0)	\$1,284
BofA	111	2%	227%	3(4)	\$1,614
Chabot	18	5%	46%	3(1)	\$4,510
50 Douglas	61	21%	85%	4(4)	\$2,000
2530 Arnold	61	16%	92%	1(3)	\$2,000
Echelon	78	25%	110%	4(3)	\$3,620
Gilead	71	10%	208%	4(1)	\$7,500
IKEA	219	12%	272%	2(0)	\$5,050
Oracle	45	10%	65%	1(0)	\$375
Target	33	10%	56%	4(1)	\$3,312
USPS	202	15%	265%	0(2)	\$12,000
Total (All Sites)⁷	951	13.4%			\$57.62

**Automated Demand Response In Commercial Facilities
Accelerating Deployment for Summer 2007**

Table 2
Preliminary Results of LBNL / PG&E Auto-CPP - Summer 2006
(Subject to minor changes with temperature data and baseline adjustments)

Site name	Savings During DR Events				# of 2006 events ⁵	Total Setup cost ^{6 / site}	Setup Cost \$/kW 6-hour event)	Setup Cost \$/kW 15-minute event
	kW Ave ¹	kW Max ²	WBP% Ave ³	WBP% Max ⁴				
Office	98	152	29%	43%	11	\$13,324	\$136	\$88
Office- Data Center	328	423	7%	8%	11	\$2,900	\$9	\$7
Museum	-2	212	-2%	65%	6	\$6,010	NA	\$28
Office	86	234	18%	41%	11	\$3,500	\$16	\$5
Office	36	104	9%	24%	11			
Detention Center	98	316	16%	48%	11			
Office	99	176	23%	38%	11	\$3,620	\$37	\$21
Office - Lab	27	25	11%	13%	5	\$4,500	\$63	\$19
Office - Lab	33	85	9%	25%	5			
Office - Lab	11	130	2%	30%	5			
Retail	76	226	7%	19%	5	\$6,360	\$84	\$28
Office	98	231	23%	41%	11	\$1,875	\$19	\$8
Retail	72	114	17%	25%	11	\$3,312	\$46	\$29
Total (All Sites)⁷	1,060	2,429	13%	33%	114	\$5,045	\$62	\$27

* B of A uses June 23rd data because July data was problematic.

kW Ave¹ kW average shed over the last 3 hrs. of a 6 hr. event

kW Max² kW maximum shed during any 15 min. interval.

WBP% Ave³ Whole Building Power, % shed over the last 3 hrs. of a 6 hr. event

WBP% Max⁴ Whole Building Power, % maximum shed during any 15 min. interval.

of 2006 events⁵ As of 8/4/06, Qty 11 CPP events have been called in zone-2 and Qty 5 in zone-1. All sites located in zone-2 except Gilead and IKEA.

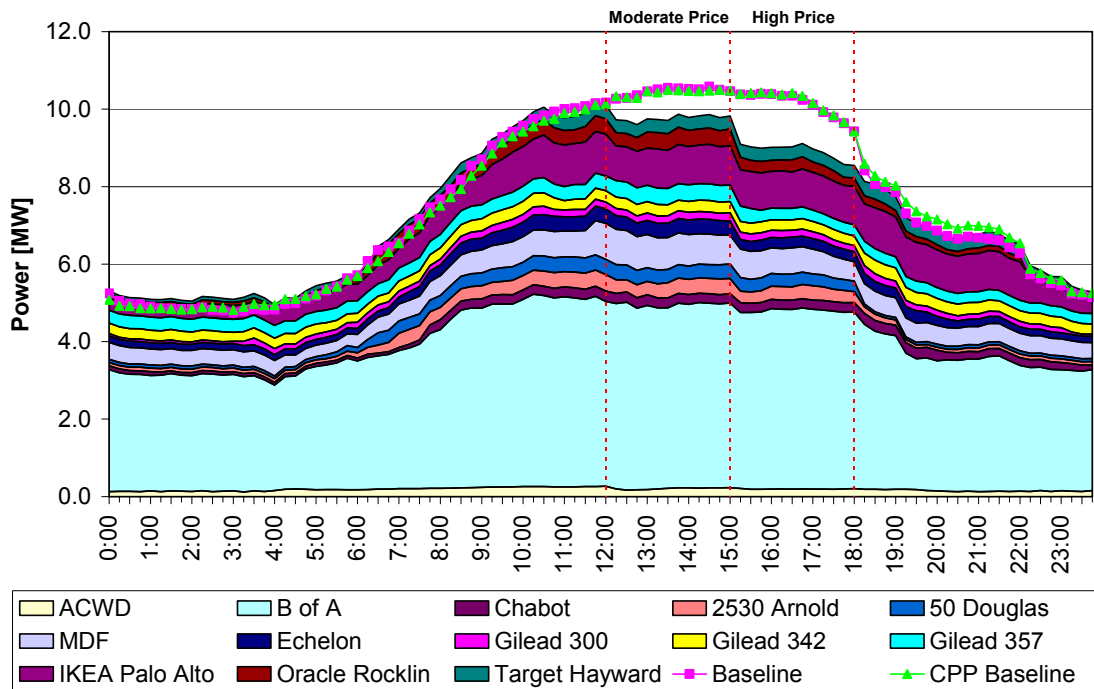
Setup cost⁶ Includes parts & labor for installation (\$1,500 for CLIR box, EMCS programming, wiring etc.). Does not include recruitment costs

Total (All Sites)⁷ Averages were calculated with each site of equal "weight".

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Figure 1

Aggregated Demand Saving, 6/23/2006 (OAT: 87 °F)



Sample total aggregated load on June 23, 2006, one of the PG&E CPP days. Individual loads for 13 buildings are shown along with the aggregated demand response using the LBNL baseline and the CPP baseline. These baselines are nearly identical on this day, though on warmer days the LBNL baseline is higher because it accounts for hourly weather affects. The 87 F shown reflects the average of the daily maximum temperatures at each building. The 13 buildings shed 1100 kW on this day. The horizontal lines reflect the two CPP periods – medium price from noon to 3 and high price from 3 to 6 pm.

(END OF ATTACHMENT A)

INFORMATION REGARDING SERVICE

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Dated August 22, 2006, at San Francisco, California.

/s/ KRIS KELLER

Kris Keller

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A0506008/A0506017

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